PATENT
1390.C2/CPI/PJS
7828.7063

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Continuation Application of	)	Examiner: not assigned
Nulman, et al.	)	
Parent Serial No.: 08/851,946	)	Art Unit: not assigned
Parent Filing Date: May 6, 1997	)	

For: COILS FOR GENERATING A PLASMA AND FOR SPUTTERING

FIRST PRELIMINARY AMENDMENT

Assistant Commissioner of Patents
Washington, D.C. 20231

Dear Sirs:

Prior to issuing a first action in the above-referenced continuation application, please enter and consider the following amendments:

IN THE SPECIFICATION:

Please replace the paragraph beginning at page 1, line 1, with the following rewritten paragraph:

-- This application is a continuation of application serial number 08/851,946 entitled "Coils for Generating a Plasma and for Sputtering," filed May 6, 1997, which is a continuation-in-part of application serial number 08/644,096 entitled "Coils for Generating a Plasma and for Sputtering," filed May 10, 1996, which is a continuation-in-part of copending application serial no. 08/647,184 entitled "Sputtering Coil for Generating a Plasma," filed May 9, 1996. –

On page 4, line 25, after the word "aluminum" insert the sentence "In other embodiments the target can be made of a material such as Cr, Te or SiO_2."

IN THE CLAIMS:

Please cancel Claims 2-40 without prejudice.

Please enter the current claim set as follows:

1. An apparatus for sputter deposition of a film layer onto a substrate, comprising:
a vacuum chamber having a substrate support member maintainable therein;
a first biasable target disposed in said chamber; and

a second biasable target disposed in said chamber adjacent to and extending substantially around a space defined between said target and said substrate support.

41. An apparatus for use with a signal source, for sputter deposition of a film layer onto a substrate, comprising:

a vacuum chamber having a substrate support member disposed therein, a plasma generation area within said chamber, and a shield having a wall which substantially encircles said plasma generation area and said substrate support member;

a first biasable target disposed in said chamber;

a capacitor; and

a sputterable coil insulatively carried by said shield wall and having a first end coupled to said signal source and a second end coupled to said capacitor, wherein said coil substantially encircles said plasma generation area and is positioned to couple energy inductively into said plasma generation area and positioned adjacent to said substrate support member to sputter material from said coil onto said substrate.

42. The apparatus of claim 41 wherein said shield is generally cylindrical in shape.

43. The apparatus of claim 41 wherein said coil is a single turn coil.

44. The apparatus of claim 41 wherein said coil is ribbon-shaped.

45. The apparatus of claim 41 wherein said capacitor maintains a bias on said coil at a level sufficient to cause said coil to be sputtered in the presence of a plasma.

46. The apparatus of claim 41, further including a first power supply coupled to said first target and wherein said source includes a second power supply coupled to said coil.

47. The apparatus of claim 46, wherein said second power supply is an RF power supply.

48. The apparatus of claim 47 further comprising a third power supply coupled to said coil.

49. The apparatus of claim 41, further including a second biasable sputter target disposed between said first biasable target and said substrate support.

50. The apparatus of claim 49, wherein said second sputter target is DC biased.

51. The apparatus of claim 50, wherein said second target is negatively biased.

52. The apparatus of claim 51, wherein each of said targets is of the same material.

53. The apparatus of claim 41 further comprising a second target carried by said chamber spaced from the first target and formed of the same type of material as said first target, said second target being positioned to sputter said second target material onto said workpiece so that said coil material, said second target material and said first target material are deposited on said workpiece to form a layer.

54. The apparatus of claim 53 further comprising a biasing circuit coupled to said second target.

55. The apparatus of claim 53 wherein said coil is formed of the same type of material as said first target, said coil being positioned to sputter said coil material onto said workpiece so that said coil material together with said first and second target materials are deposited on said workpiece to form a layer.

56. The apparatus of claim 53 wherein said second target is a closed ring.

57. The apparatus of claim 53 wherein said second target is a cylinder.

58. The apparatus of claim 53 wherein said signal source is a generator for applying RF power to said coil, said apparatus further comprising:

a source for applying a DC bias to said first target; and

a source for applying a DC bias to said second target.

59. The apparatus of claim 53 wherein said coil has a plurality of turns and said second target has a plurality of rings interleaved with the turns of said coil.

60. A method of depositing material on a workpiece in a sputter deposition chamber, comprising

sputtering target material onto said workpiece from a target positioned in said chamber;

sputtering coil material onto said workpiece from a coil having a first end coupled to a signal source and a second end coupled to ground, said coil being insulatively carried by a shield wall substantially encircling a plasma generation area and positioned adjacent to and at least partially encircling said workpiece; and

inductively coupling energy from said coil into said plasma generation area.

61. The method of claim 60 wherein said shield wall is generally cylindrical in shape.

62. The method of claim 60 wherein said coil is a single turn coil.

63. The method of claim 60 wherein said coil is ribbon-shaped.

64. The method of claim 60 wherein said target material sputtering comprises applying DC power to said target and said coil material sputtering comprising applying RF power from said source to said coil.

65. The apparatus of claim 64 wherein said coil material sputtering further

comprises applying power from another power supply coupled to said coil.

66. The method of claim 60 wherein said target material and said coil material are the same type of material.

67. The method of claim 60 wherein said target material and said coil material are different types of material.

68. The method of claim 60 wherein said target material and said coil material are sputtered at different rates.

69. The method of claim 60 further comprising sputtering a second target material onto the workpiece from a second target positioned above the workpiece.

70. The method of claim 69 wherein said first target material sputtering comprises applying DC power to said first target and said second target material sputtering comprises applying DC power to said second target.

71. The method of claim 69 wherein said first and second target materials and said first coil material are the same type of material.

72. The method of claim 71 wherein said coil is formed of the same type of material as said first and second target materials, said first coil being positioned to sputter said first coil material onto the workpiece so that said first coil material together with said second coil material and said target material are deposited on the workpiece to form a layer.

73. The method of claim 69 wherein said coil has a plurality of turns and said second target comprises a plurality of rings interleaved with turns of said coil.

74. An apparatus for depositing material on a semiconductor substrate, comprising:
a sputter deposition chamber having a plasma generation area;

substrate support means disposed in said chamber, for supporting a semiconductor substrate adjacent said plasma generation area;

target means disposed in said chamber, for sputtering target material onto said substrate; and

coil means disposed in said chamber adjacent to said substrate support means and substantially encircling said plasma generation area, for inductively coupling energy into said plasma generation area and for sputtering coil material onto said substrate.

REMARKS

Claims 1 and 41-74 are in the case.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

The present application names joint inventors. Please be advised that the parent application number 08/851,946 has been assigned by each of the joint inventors to a common assignee, Applied Materials, Inc., the employer of each of the joint inventors at the time the inventions of the present application were made. It is further the understanding of the undersigned that the inventions were commonly owned by Applied Materials, Inc. at the time the inventions were made pursuant to the employment of the joint inventors by the assignee, Applied Materials, Inc.

Examination on the merits is respectfully requested and allowance at an early date is earnestly solicited.

Please direct all correspondence in this case to:

Patent Counsel
APPLIED MATERIALS, INC.
Post Office Box 450A
Santa Clara, California 95052

Please direct all telephone calls to the undersigned.

Respectfully submitted,

William K. Konrad
Reg. No. 28,858
Customer No. 24033
Konrad Raynes Victor & Mann, LLP
315 S. Beverly Drive, Suite 210
Beverly Hills, CA 90212

Date: 1/17/02

(310) 556-7983

I hereby certify that this correspondence is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service on the date indicated above and is addressed to: Assistant Commissioner for Patents, Box Patent Application, Washington, D.C. 20231.

William K. Konrad (Date) 1/17/02

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the specification:

Paragraph beginning at page 1, line 1 has been amended as follows:

~~This application is a continuation-in-part application of copending application Serial No. 08/644,096, entitled "Coils for Generating a Plasma and for Sputtering," filed May 10, 1996 (attorney docket No. 1390/PVD/DV) which is a continuation-in-part of copending application serial No. 08/647,184, entitled "Sputtering Coil for Generating a Plasma," filed May 9, 1996 (Attorney Docket 1383/PVD/DV).~~

-- This application is a continuation of application serial number 08/851,946 entitled "Coils for Generating a Plasma and for Sputtering," filed May 6, 1997, which is a continuation-in-part of application serial number 08/644,096 entitled "Coils for Generating a Plasma and for Sputtering," filed May 10, 1996, which is a continuation-in-part of copending application serial no. 08/647,184 entitled "Sputtering Coil for Generating a Plasma," filed May 9, 1996. –

On page 4, line 25, after the word "aluminum" insert the sentence "In other embodiments the target can be made of a material such as Cr, Te or SiO_2."

In the claims:

Claims 2-40 have been cancelled.

New claims 41-74 are added as follows:

41. An apparatus for use with a signal source, for sputter deposition of a film layer onto a substrate, comprising:

a vacuum chamber having a substrate support member disposed therein, a plasma generation area within said chamber, and a shield having a wall which substantially encircles

said plasma generation area and said substrate support member;

a first biasable target disposed in said chamber;

a capacitor; and

a sputterable coil insulatively carried by said shield wall and having a first end coupled to said signal source and a second end coupled to said capacitor, wherein said coil substantially encircles said plasma generation area and is positioned to couple energy inductively into said plasma generation area and positioned adjacent to said substrate support member to sputter material from said coil onto said substrate.

42. The apparatus of claim 41 wherein said shield is generally cylindrical in shape.

43. The apparatus of claim 41 wherein said coil is a single turn coil.

44. The apparatus of claim 41 wherein said coil is ribbon-shaped.

45. The apparatus of claim 41 wherein said capacitor maintains a bias on said coil at a level sufficient to cause said coil to be sputtered in the presence of a plasma.

46. The apparatus of claim 41, further including a first power supply coupled to said first target and wherein said source includes a second power supply coupled to said coil.

47. The apparatus of claim 46, wherein said second power supply is an RF power supply.

48. The apparatus of claim 47 further comprising a third power supply coupled to said coil.

49. The apparatus of claim 41, further including a second biasable sputter target disposed between said first biasable target and said substrate support.

50. The apparatus of claim 49, wherein said second sputter target is DC biased.

51. The apparatus of claim 50, wherein said second target is negatively biased.

52. The apparatus of claim 51, wherein each of said targets is of the same material.

53. The apparatus of claim 41 further comprising a second target carried by said chamber spaced from the first target and formed of the same type of material as said first target, said second target being positioned to sputter said second target material onto said workpiece so that said coil material, said second target material and said first target material are deposited on said workpiece to form a layer.

54. The apparatus of claim 53 further comprising a biasing circuit coupled to said second target.

55. The apparatus of claim 53 wherein said coil is formed of the same type of material as said first target, said coil being positioned to sputter said coil material onto said workpiece so that said coil material together with said first and second target materials are deposited on said workpiece to form a layer.

56. The apparatus of claim 53 wherein said second target is a closed ring.

57. The apparatus of claim 53 wherein said second target is a cylinder.

58. The apparatus of claim 53 wherein said signal source is a generator for applying RF power to said coil, said apparatus further comprising:

a source for applying a DC bias to said first target; and

a source for applying a DC bias to said second target.

59. The apparatus of claim 53 wherein said coil has a plurality of turns and said second target has a plurality of rings interleaved with the turns of said coil.

60. A method of depositing material on a workpiece in a sputter deposition chamber, comprising

sputtering target material onto said workpiece from a target positioned in said chamber;

sputtering coil material onto said workpiece from a coil having a first end coupled to a signal source and a second end coupled to ground, said coil being insulatively carried by a shield wall substantially encircling a plasma generation area and positioned adjacent to and at least partially encircling said workpiece; and

inductively coupling energy from said coil into said plasma generation area.

61. The method of claim 60 wherein said shield wall is generally cylindrical in shape.

62. The method of claim 60 wherein said coil is a single turn coil.

63. The method of claim 60 wherein said coil is ribbon-shaped.

64. The method of claim 60 wherein said target material sputtering comprises applying DC power to said target and said coil material sputtering comprising applying RF power from said source to said coil.

65. The apparatus of claim 64 wherein said coil material sputtering further comprises applying power from another power supply coupled to said coil.

66. The method of claim 60 wherein said target material and said coil material are the same type of material.

67. The method of claim 60 wherein said target material and said coil material are different types of material.

68. The method of claim 60 wherein said target material and said coil material are sputtered at different rates.

69. The method of claim 60 further comprising sputtering a second target material onto the workpiece from a second target positioned above the workpiece.

70. The method of claim 69 wherein said first target material sputtering comprises applying DC power to said first target and said second target material sputtering comprises applying DC power to said second target.

71. The method of claim 69 wherein said first and second target materials and said first coil material are the same type of material.

72. The method of claim 71 wherein said coil is formed of the same type of material as said first and second target materials, said first coil being positioned to sputter said first coil material onto the workpiece so that said first coil material together with said second coil material and said target material are deposited on the workpiece to form a layer.

73. The method of claim 69 wherein said coil has a plurality of turns and said second target comprises a plurality of rings interleaved with turns of said coil.

74. An apparatus for depositing material on a semiconductor substrate, comprising:

a sputter deposition chamber having a plasma generation area;

substrate support means disposed in said chamber, for supporting a semiconductor substrate adjacent said plasma generation area;

target means disposed in said chamber, for sputtering target material onto said substrate; and

coil means disposed in said chamber adjacent to said substrate support means and substantially encircling said plasma generation area, for inductively coupling energy into said plasma generation area and for sputtering coil material onto said substrate.

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Parent Serial No.: 08/851,946	)	Art Unit: not assigned
Parent Filing Date: May 6, 1997	)	

For: COILS FOR GENERATING A PLASMA AND FOR SPUTTERING

SECOND PRELIMINARY AMENDMENT

Assistant Commissioner of Patents
Washington, D.C. 20231

Dear Sirs:

After granting a filing date and prior to issuing a first action in the above-referenced continuation application, please enter and consider the following amendments:

IN THE CLAIMS:

Please cancel Claim 1 without prejudice.

Please enter the current claim set as follows:

41. An apparatus for use with a signal source, for sputter deposition of a film layer onto a substrate, comprising:

a vacuum chamber having a substrate support member disposed therein, a plasma generation area within said chamber, and a shield having a wall which substantially encircles said plasma generation area and said substrate support member;

a first biasable target disposed in said chamber;

a capacitor; and

a sputterable coil insulatively carried by said shield wall and having a first end coupled to said signal source and a second end coupled to said capacitor, wherein said coil substantially encircles said plasma generation area and is positioned to couple energy inductively into said plasma generation area and positioned adjacent to said substrate support member to sputter material from said coil onto said substrate.

42. The apparatus of claim 41 wherein said shield is generally cylindrical in shape.

43. The apparatus of claim 41 wherein said coil is a single turn coil.

44. The apparatus of claim 41 wherein said coil is ribbon-shaped.

45. The apparatus of claim 41 wherein said capacitor maintains a bias on said coil at a level sufficient to cause said coil to be sputtered in the presence of a plasma.

46. The apparatus of claim 41, further including a first power supply coupled to said first target and wherein said source includes a second power supply coupled to said coil.

47. The apparatus of claim 46, wherein said second power supply is an RF power supply.

48. The apparatus of claim 47 further comprising a third power supply coupled to said coil.

49. The apparatus of claim 41, further including a second biasable sputter target disposed between said first biasable target and said substrate support.

50. The apparatus of claim 49, wherein said second sputter target is DC biased.

51. The apparatus of claim 50, wherein said second target is negatively biased.

52. The apparatus of claim 51, wherein each of said targets is of the same material.

53. The apparatus of claim 41 further comprising a second target carried by said chamber spaced from the first target and formed of the same type of material as said first target, said second target being positioned to sputter said second target material onto said workpiece so that said coil material, said second target material and said first target material are deposited on said workpiece to form a layer.

54. The apparatus of claim 53 further comprising a biasing circuit coupled to said second target.

55. The apparatus of claim 53 wherein said coil is formed of the same type of material as said first target, said coil being positioned to sputter said coil material onto said workpiece so that said coil material together with said first and second target materials are deposited on said workpiece to form a layer.

56. The apparatus of claim 53 wherein said second target is a closed ring.

57. The apparatus of claim 53 wherein said second target is a cylinder.

58. The apparatus of claim 53 wherein said signal source is a generator for applying RF power to said coil, said apparatus further comprising:

a source for applying a DC bias to said first target; and

a source for applying a DC bias to said second target.

59. The apparatus of claim 53 wherein said coil has a plurality of turns and said second target has a plurality of rings interleaved with the turns of said coil.

60. A method of depositing material on a workpiece in a sputter deposition chamber, comprising

sputtering target material onto said workpiece from a target positioned in said chamber;

sputtering coil material onto said workpiece from a coil having a first end coupled to a signal source and a second end coupled to ground, said coil being insulatively carried by a shield wall substantially encircling a plasma generation area and positioned adjacent to and at least partially encircling said workpiece; and

inductively coupling energy from said coil into said plasma generation area.

61. The method of claim 60 wherein said shield wall is generally cylindrical in shape.

62. The method of claim 60 wherein said coil is a single turn coil.

63. The method of claim 60 wherein said coil is ribbon-shaped.

64. The method of claim 60 wherein said target material sputtering comprises applying DC power to said target and said coil material sputtering comprising applying RF power from said source to said coil.

65. The apparatus of claim 64 wherein said coil material sputtering further comprises applying power from another power supply coupled to said coil.

66. The method of claim 60 wherein said target material and said coil material are the same type of material.

67. The method of claim 60 wherein said target material and said coil material are different types of material.

68. The method of claim 60 wherein said target material and said coil material are sputtered at different rates.

69. The method of claim 60 further comprising sputtering a second target material onto the workpiece from a second target positioned above the workpiece.

70. The method of claim 69 wherein said first target material sputtering comprises applying DC power to said first target and said second target material sputtering comprises applying DC power to said second target.

71. The method of claim 69 wherein said first and second target materials and said first coil material are the same type of material.

72. The method of claim 71 wherein said coil is formed of the same type of material as said first and second target materials, said first coil being positioned to sputter said first coil material onto the workpiece so that said first coil material together with said second coil material and said target material are deposited on the workpiece to form a layer.

73. The method of claim 69 wherein said coil has a plurality of turns and said second target comprises a plurality of rings interleaved with turns of said coil.

74. An apparatus for depositing material on a semiconductor substrate, comprising:

a sputter deposition chamber having a plasma generation area;

substrate support means disposed in said chamber, for supporting a semiconductor substrate adjacent said plasma generation area;

target means disposed in said chamber, for sputtering target material onto said substrate; and

coil means disposed in said chamber adjacent to said substrate support means and substantially encircling said plasma generation area, for inductively coupling energy into said plasma generation area and for sputtering coil material onto said substrate.

REMARKS

Claims 41 - 74 are in the case.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

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Examination on the merits is respectfully requested and allowance at an early date is earnestly solicited.

Please direct all correspondence in this case to:

Patent Counsel
APPLIED MATERIALS, INC.
Post Office Box 450A
Santa Clara, California 95052

Please direct all telephone calls to the undersigned.

Respectfully submitted,

William K. Konrad
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315 S. Beverly Drive, Suite 210
Beverly Hills, CA 90212

Date: 1/17/02

(310) 556-7983

I hereby certify that this correspondence is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service on the date indicated above and is addressed to: Assistant Commissioner for Patents, Box Patent Application, Washington, D.C. 20231

William K. Konrad — 1/17/02 (Date)

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the claims:

Claim 1 is cancelled.